WEST

Help | Logout | Interrupt

Main Menu | Search Form | Posting Counts | Show S Numbers | Edit S Numbers | Preferences | Cases

Search Results -

Term	Documents
SOUND.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	345664
SOUNDS.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	53016
(8 AND SOUND).USPT,PGPB,JPAB,EPAB,DWPI,TDBD.	2
(L8 AND SOUND).USPT,PGPB,JPAB,EPAB,DWPI,TDBD.	2

Database:
US Patents Full-Text Database
US Pre-Grant Publication Full-Text Database
JPO Abstracts Database
EPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L9

Refine Search

Recall Text Clear

Search History

DATE: Thursday, October 17, 2002 Printable Copy Create Case

Set Name side by side	**Query**	**Hit Count**	**Set Name** result set
DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=ADJ			
L9	L8 and sound	2	L9
L8	L7 and filter$3	2	L8
L7	l1 and L6	3	L7
L6	L4 and noise	3102	L6
L5	l3 and L4	3	L5
L4	material near2 flow	86440	L4
L3	l1 and L2	30	L3
L2	crop	85209	L2
L1	harvest$3 near2 machine near2 sensor	50	L1

END OF SEARCH HISTORY

WEST

Generate Collection | Print

L7: Entry 2 of 3 File: USPT Feb 27, 2001

DOCUMENT-IDENTIFIER: US 6192664 B1
TITLE: Harvester with crop flow rate sensor

Abstract Text (1):
An agricultural harvesting machine, such as a combine harvester comprising a header for collecting crop material from a field, an auger and straw elevator for conveying the collected crop into the harvesting machine and a threshing and cleaning system. The harvesting machine is equipped with a sensor for sensing the flow rate of at least a portion of the collected crop. The sensor is provided with dampening system for dampening mechanical vibrations caused by the header, the auger and the cleaning and threshing system. The sensor comprises an idler sprocket that senses the torque transmitted by a chain transmission upon a conveyor, such as the transverse conveyor of a header. The dampening system involves an inertia wheel attached to the driving sprocket of the chain transmission, an elastic coupling and further inertia wheel driven by the primary drive shaft of the header.

Brief Summary Text (6):
It is also known to monitor the load on one or more components of the harvester for automatically adjusting the settings thereof. Such settings may involve the travel speed of the harvester over the field or the speed of one of the crop processing apparatus inside the harvester, such as the threshing drum speed in case of a combine harvester. A prior art apparatus that has been used for predicting the total load on the crop processing apparatus measures the rate of incoming crop material at the header of a combine harvester. The header is equipped with a transverse auger that conveys cut crop material to the mouth of a straw elevator registering w ith the center of the header. The power required for rotating the auger is proportional to the mass flow rate of the incoming material and can be derived from the force on an idler sprocket in the chain transmission of the auger. A closed vessel, filled with hydraulic oil, and sealed with a rubber sheet was installed below the idler. The idler sprocket was mounted on a lever having an arm that engages the outer surface of the rubber sheet. The pressure of the arm on the sheet and hence the oil pressure in the vessel is directly related to the force on the sprocket and consequently to the torque used for rotating the auger. The pressure in the vessel is measured by an electric pressure transducer, which provides a good indication of the force on the idler sprocket. However this signal suffers from substantial noise caused by the other components of the header. Moreover the lever mounting of the idler was easily jammed by stray straw which accumulated onto and behind the lever.

Brief Summary Text (8):
Therefore it is an object of the present invention to provide a harvester equipped with means for measuring loads on components thereof for establishing the quantity of crop material passing at a particular location of the harvester, said means not suffering from excessive noise caused by surrounding components of the harvester.

Brief Summary Text (15):
Advantageously, the dampening means may be applied to a configuration comprising a sensor measuring the power taken up by a conveyor drive line. Such sensor generates a signal which is characteristic for the mass flow rate of the material transported by the conveyor. The dampening means may be constituted by a flywheel or inertia wheel, which may be driven via a flexible coupling by another inertia wheel.

Brief Summary Text (16):

The conveyor drive line may be a belt transmission comprising a pair of sheaves and a belt, or a chain transmission comprising a pair of sprocket wheels and a chain. The flow rate sensor may then sense the force induced on an idler wheel or sprocket by the belt or chain of the transmission. Such force is proportional to the torque transmitted by the transmission, which force in turn is proportional to the mass flow rate of the material transported by the conveyor.

Drawing Description Text (7):
FIG. 5 is a graph representing the noise sensed by the measuring device of FIG. 2.

Detailed Description Text (17):
FIG. 5 shows a graph 95 of the signal of the pressure transducer 79 generated when the auger drive sprocket 64 is attached directly to a standard sheave of the sickle bar drive line, without the use of inertia wheels or an intermediate flexible coupling. The prominent high frequency noise follows from the to-and-fro movement of the sickle bar 17. The auger torque signal 95 was measured with an empty running header 14.

Detailed Description Text (18):
Graph 96 represents the signal of the same transducer 79 after installation of the inertia wheel 90, the flexible coupling 87 and the thickened sheave 58. The high frequency noise with its high amplitude has disappeared and there only remains a smaller disturbance from the rotation of the inertia wheel 90 itself, due to an imperfect alignment of the inertia wheel 90 and the drive sprocket 64 with respect to the drive shaft 50. This noise may be reduced by a better alignment of these components.

WEST

Generate Collection | Print

L7: Entry 2 of 3 File: USPT Feb 27, 2001

US-PAT-NO: 6192664
DOCUMENT-IDENTIFIER: US 6192664 B1

TITLE: Harvester with crop flow rate sensor

DATE-ISSUED: February 27, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Missotten; Bart M. A.	Leuven			BE
Strubbe; Gilbert J. I.	Loppem			BE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
New Holland North America, Inc.	New Holland	PA			02

APPL-NO: 09/ 307013 [PALM]
DATE FILED: May 7, 1999

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
GB	9811024	May 22, 1998

INT-CL: [07] G01 F 1/30, A01 D 61/04

US-CL-ISSUED: 56/10.2R; 73/861.73, 460/1
US-CL-CURRENT: 56/10.2R; 460/1, 73/861.73

FIELD-OF-SEARCH: 73/861.71, 73/861.72, 73/861.73, 73/861.74, 73/861.41, 460/1, 460/6, 460/7, 356/343, 56/1.2R, 56/1.2B, 56/1.2C, 56/1.2G, 56/1.2J, 56/DIG.15, 701/50, 701/207, 701/213

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected | Search ALL

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
5318475	June 1994	Schrock et al.	460/1
5736652	April 1998	Strubbe	73/861.73
5920018	July 1999	Wilkerson et al.	73/861.41
5959218	September 1999	Strubbe	73/861.73

ART-UNIT: 361

PRIMARY-EXAMINER: Pezzuto; Robert E.

ABSTRACT:

An agricultural harvesting machine, such as a combine harvester comprising a header for collecting crop material from a field, an auger and straw elevator for conveying the collected crop into the harvesting machine and a threshing and cleaning system. The harvesting machine is equipped with a sensor for sensing the flow rate of at least a portion of the collected crop. The sensor is provided with dampening system for dampening mechanical vibrations caused by the header, the auger and the cleaning and threshing system. The sensor comprises an idler sprocket that senses the torque transmitted by a chain transmission upon a conveyor, such as the transverse conveyor of a header. The dampening system involves an inertia wheel attached to the driving sprocket of the chain transmission, an elastic coupling and further inertia wheel driven by the primary drive shaft of the header.

15 Claims, 5 Drawing figures

WEST

End of Result Set

Generate Collection | Print

L9: Entry 2 of 2 File: USPT Nov 14, 2000

US-PAT-NO: 6146268
DOCUMENT-IDENTIFIER: US 6146268 A

TITLE: Sensor for harvesting machines

DATE-ISSUED: November 14, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Behnke; Willi	Steinhagen			DE
Hubner; Ralf	Dresden			DE
Damm; Wolfram	Dresden			DE
Muller; Harald	Dresden			DE
Bernhardt; Gerd	Dresden			DE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Claas Selbstfahrende Erntemaschinen GmbH	Harsewinkel			DE	03

APPL-NO: 09/ 097238 [PALM]
DATE FILED: June 12, 1998

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	197 25 028	June 13, 1997

INT-CL: [07] A01 D 75/18, A01 D 75/28, A01 F 12/16, A01 F 21/00

US-CL-ISSUED: 460/4; 460/5, 56/10.2C
US-CL-CURRENT: 460/4; 460/5, 56/10.2C

FIELD-OF-SEARCH: 56/1.2B, 56/1.2C, 56/1.2D, 56/DIG.15, 460/4, 460/5, 460/7

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected | Search ALL

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	3563013	February 1971	Elfes	460/5
☐	3606745	September 1971	Girodat	460/5
☐	3939846	February 1976	Drozhzhin et al.	130/27R
☐	4036065	July 1977	Strelioff et al.	73/432R
☐	4149415	April 1979	Harbour	460/5
☐	4230130	October 1980	Staiert	130/27R
☐	4259829	April 1981	Strubbe	460/5
☐	4266421	May 1981	McDougal	73/1
☐	4393704	July 1983	Bartko	73/432R
☐	4481756	November 1984	Schartz	460/5
☐	4490964	January 1985	Eldredge	460/5
☐	4517792	May 1985	Denning et al.	56/10.2
☐	4540003	September 1985	Osselaere	130/27T
☐	4902264	February 1990	Diekhans et al.	460/5
☐	5015997	May 1991	Strubbe	340/684
☐	5046362	September 1991	Strubbe	73/579
☐	5312299	May 1994	Behnke et al.	460/5

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
00 93 991 A1	May 1983	EP	
03 39 142 B1	April 1988	EP	
22 03 221	January 1972	DE	
24 48 745 C2	October 1974	DE	
28 02 679 A1	January 1978	DE	
30 31 812 C2	August 1980	DE	
37 31 080 C2	September 1987	DE	
37 31 080 A1	September 1987	DE	
38 33 363 C2	September 1988	DE	
41 04 179 C2	February 1991	DE	
42 35 809 C1	October 1992	DE	
91 15 701 U1	December 1992	DE	
196 12 540 A1	March 1996	DE	

ART-UNIT: 361

PRIMARY-EXAMINER: Will; Thomas B.

ASSISTANT-EXAMINER: Kovacs; Arpad Fabian

ABSTRACT:

The invention relates to a sensor for determining the structure-borne sound

vibrations generated by the impingement of grains on a pulse detector in an agricultural machine for harvesting crops and to a device for operational monitoring of the sensor and improved signal evaluation.

Such sensors are used to monitor threshing and separating performance at various points in a harvesting machine. Depending on the area of application, various forms of a pulse detector are used. These can have the shape of a plate, a tube, a rod or other similar profiles. Attached to these detectors are vibration detectors. A particularly strong connection between the vibration detector and the pulse detector is achieved by using a piezo-ceramic vibration sensor and its attachment by means of a screw connection.

25 Claims, 8 Drawing figures

L7: Entry 3 of 3 File: USPT Nov 14, 2000

DOCUMENT-IDENTIFIER: US 6146268 A
TITLE: Sensor for harvesting machines

Brief Summary Text (2):
The present invention relates generally to agricultural machinery and, more particularly, to improvements to harvesting machines. The improvement relates specifically to a sensor for detecting structure-borne noise vibrations, which are generated by the impingement of harvested material on a pulse detector, and to means for improving and monitoring the operation of the sensor.

Brief Summary Text (3):
A sensor is known from German Patent 24 48 745. To measure the lost grains at the discharge ends of straw walkers and in grain separation or cleaning devices, steeply inclined pulse detector plates are attached via damping members over the entire conveyor width. An elector-acoustic converter is attached to the underside of these plates by means of a spring clamp. The residual or lost grains present in the flow of material drop onto the pulse detector plates and cause vibrations, which the pulse detector plates convey to the electro-acoustic converter. The plates are connected via the converter casing to a microphone and convert the vibrations into an electrical signal. The vibrations are transmitted over a plurality of coupling points. Due to its construction and the manufacturing steps entailed therewith, as well as the influences of corrosion, dirt and other items, each coupling point represents a weak point in the sensor. The signal sensitivity of this sensor is therefore inconsistent and is subject to fluctuations determined by aging.

Brief Summary Text (23):
An additional advantage of the invention is the simplicity with which the sensor attaches to the harvesting machine.

Brief Summary Text (24):
It is known in the art to connect a sensor to the harvesting machine via vibration dampers. This attachment damps the vibratory performance of the pulse detector. It has therefore proved particularly advantageous to use the vibration-sensor as a connecting member between a vibration damper and the pulse detector. The vibration damper is then connected to the harvesting machine via a securing means. The vibration sensor then, in addition to determining structure-borne noise vibrations, also takes over part of the function of securing the pulse detector in the harvesting machine.

Brief Summary Text (25):
Another embodiment according to the invention enables the connecting member between the pulse detector and the vibration sensor to be connected to the harvesting machine via vibration damping material, such as a rubber bushing socket. A structural part, which permits a certain spacing between the pulse detector and the vibration sensor, can also serve this purpose.

Drawing Description Text (9):
FIG. 7 is a front view similar to FIG. 5, but illustrating the sensor with the pulse detector located in the direction of the flow of harvested material, and a connecting member which is connected to a vibration-damper; and

Detailed Description Text (3):
In FIG. 2, the vibration sensor 1 is screwed directly to a plate-shaped pulse detector 10. The pulse detector 10 is formed by a plate, which extends across part of or the whole width of the separator or threshing unit, and is preferably located vertically to the flow of harvested material. The vibration sensor 1 is screwed by a flat head screw 11 through the bore 7 to the pulse detector 10. The screw head 1 5 has a diameter which corresponds approximately to that of the diameter of the coupling surface, which results in a uniform surface pressure. An electronic evaluation system 12 is coupled directly to the vibration sensor 1, allowing weak measurement signals to be transmitted directly to the electronic evaluation system 12 without notable losses. The measurement signals are then transmitted via the signal line 13 communication network 40, or bus system 41 to a subsequent evaluation unit 12A, operational testing unit 38 or display unit 39.

Detailed Description Text (4):
In FIG. 3, the vibration sensor 1 is shown in conjunction with a tubular pulse detector 14. The pulse detector 14 extends over part of or over the totality of the separator or threshing unit width. The pulse detector 14 can also extend beyond the separator or threshing unit width so that the vibration sensor 1 is not exposed directly to the flow of material. An adapter 16, which contains a centrally located bore 18, is pressed into one tube end. The vibration sensor 1 is fastened with the aid of an elongate screw 17 into the bore 18.

Detailed Description Text (6):
Securing members 19 are attached to the ends of the pulse detector 10. These securing members 19 connect the sensor 23 to the harvesting machine by vibration dampers 20. A multiple flange 22, shown at the top of FIG. 4, serves to stabilize the pulse detector 10 and also provides a guide for conductors 24.

Detailed Description Text (7):
FIG. 5 shows a rod-like or cylindrical pulse detector 25 connected directly to a vibration sensor 1 with the aid of a headless screw 26. The headless screw 26 has a bore on its unthreaded end extending vertically to the longitudinal axis of the cylindrical pulse detector 25. The bore provides a means by which the vibration sensor 1 and pulse detector 25 is connected. The headless screw 26 with the pulse detector 25 is thrust through the vibration sensor 1 and screwed to a structural part 29, cast into a vibration damper 28, and provided with an internal thread. The peripheral surface of the pulse detector 25 is connected with a specific surface pressure to the vibration sensor 1 via the tightening moment of this screw connection. A further structural part 30 with a threaded pin is also cast into the vibration damper 28. By means of this threaded pin the sensor 23 can be connected directly to the harvesting machine via a retaining bracket 31. In conjunction with a cylindrical pulse detector 25, it has proven to be particularly advantageous if the coupling point is a direct connection of the vibration sensor 1 with the peripheral surface of the pulse detector 25. As a rule, pulse detectors 25 are inserted vertically to the direction of the flow of the harvested material crop. The pulse detector 25 is then stimulated radially by the material to be measured. This stimulation can be introduced via a structural part directly into the vibration center. The structural part may be, for example, the above described headless screw 26. The pulse detector 25 is secured directly to the vibration sensor 1 by means of the threaded portion on the structural part. The peripheral surface then has direct contact with the coupling surface 2.

Detailed Description Text (9):
FIG. 7 shows another way in which the sensor 23 can be attached in a harvesting machine. A pulse detector 32 has an angled end profile with any cross-sectional shape. In this case the pulse detector 32 is located in the direction of the flow of harvested material. The bevels 37 at the ends of the pulse detector 32 prevent any straw or weeds in the flow of harvested crop from being broken up and deposited at the pulse detector 32. A plate 35 is, for example, a guide and stabilizing plate in a mower harvester's cleaning device, aligned in the direction of material flow. It extends over the entire width of the cleaning device and can serve as a securing means for one or more of the sensors 23 according to this embodiment of the invention. The sensor 23 is held in a hole in the plate 35 by a vibration-damping bushing 33 having an internal diameter which is greater than the screw diameter

selected for the connection. A structural part 34 is welded, soldered or otherwise fixed directly to the pulse detector 32. The part 34 has a head 36 with a diameter greater than the internal diameter of the socket of bushing 33. The structural part 34 has, over a length shorter than the thickness of the bushing socket 33, a diameter which roughly corresponds to the internal diameter of the bushing socket 33. The structural part then tapers to the screw diameter selected for the connection and terminates in a thread. By means of this thread and a nut 27, the pulse detector is screwed to the vibration sensor. Due to the special design of the structural part 34, the bushing socket 33 is compressed when screwed to the vibration sensor 1. The sensor 23 is thus held on the plate 35 and secured against rotation.

Detailed Description Text (10):
Furthermore, the pulse detector 32 communicates directly with the coupling surface 2 of the vibration sensor 23 via the structural part 34. The single coupling point is particularly advantageous because by means of a single screw connection the sensor 23 can be brought directly into contact with the pulse detector 32. Only one tightening moment need be taken into account during assembly. This type of attachment has the further advantage that the sensor 23 only slightly hinders the flow of harvested material, and the vibration sensor 1 and the mounted electronic evaluation system 12 are effectively protected against contamination.

CLAIMS:

19. A harvesting machine according to claim 14, including a plurality of sensors on the harvesting machine, and wherein the operational testing is carried out simultaneously on the sensors.

20. A harvesting machine according to claim 14, including a plurality of sensors on the harvesting machine, and wherein the operational testing on the sensors is carried out according to a preselected sequence.

WEST

End of Result Set

Generate Collection | Print

L9: Entry 2 of 2 File: USPT Nov 14, 2000

DOCUMENT-IDENTIFIER: US 6146268 A
TITLE: Sensor for harvesting machines

Abstract Text (1):
The invention relates to a sensor for determining the structure-borne sound vibrations generated by the impingement of grains on a pulse detector in an agricultural machine for harvesting crops and to a device for operational monitoring of the sensor and improved signal evaluation.

Brief Summary Text (2):
The present invention relates generally to agricultural machinery and, more particularly, to improvements to harvesting machines. The improvement relates specifically to a sensor for detecting structure-borne noise vibrations, which are generated by the impingement of harvested material on a pulse detector, and to means for improving and monitoring the operation of the sensor.

Brief Summary Text (3):
A sensor is known from German Patent 24 48 745. To measure the lost grains at the discharge ends of straw walkers and in grain separation or cleaning devices, steeply inclined pulse detector plates are attached via damping members over the entire conveyor width. An elector-acoustic converter is attached to the underside of these plates by means of a spring clamp. The residual or lost grains present in the flow of material drop onto the pulse detector plates and cause vibrations, which the pulse detector plates convey to the electro-acoustic converter. The plates are connected via the converter casing to a microphone and convert the vibrations into an electrical signal. The vibrations are transmitted over a plurality of coupling points. Due to its construction and the manufacturing steps entailed therewith, as well as the influences of corrosion, dirt and other items, each coupling point represents a weak point in the sensor. The signal sensitivity of this sensor is therefore inconsistent and is subject to fluctuations determined by aging.

Brief Summary Text (4):
Another loss sensor is known from German Patent 37 31 080. This sensor has only one coupling point. A piezo quartz is attached directly to the counter side of the pulse detector surface. The connection between the piezo quartz and a striker surface is produced by means of a soldering or adhesive point. This connection has at least a few serious drawbacks. When there are large mechanical or thermal stresses on the pulse detector surface, such as those which may occur during cleaning, adjustment or repair of the screens or walkers, the property of the adhesive or soldered connection to couple sound vibrations is altered. Furthermore, with such a connection, aging phenomena are of importance. These alterations are difficult to understand or detect and require the intervention of a specialist for their monitoring. Under certain circumstances, the connection may be destroyed by foreign bodies impinging on the striker surface. Reinstatement of the connection requires complete dismantling and recalibration of the sensor. Therefore for reasons of time and technical skill, in most cases of breakdown the entire sensor is changed, which leads to unnecessary costs.

Brief Summary Text (12):
The vibration of the pulse detector is introduced directly into the vibration sensor. Due to its inertia, a seismic mass exerts pressure, depending on the

amplitude and frequency of the stimulating vibration, on an annular piezo-ceramic component which lies around the coupling connection. The force acting on the piezo-ceramic effects a charge displacement within the piezo-ceramic, and thus produces a measurable electrical voltage between the top and the underside of the ceramic. This voltage is taken off via contact plates and passed to amplifier, filter and integrator circuits.

Brief Summary Text (23):
An additional advantage of the invention is the simplicity with which the sensor attaches to the harvesting machine.

Brief Summary Text (24):
It is known in the art to connect a sensor to the harvesting machine via vibration dampers. This attachment damps the vibratory performance of the pulse detector. It has therefore proved particularly advantageous to use the vibration-sensor as a connecting member between a vibration damper and the pulse detector. The vibration damper is then connected to the harvesting machine via a securing means. The vibration sensor then, in addition to determining structure-borne noise vibrations, also takes over part of the function of securing the pulse detector in the harvesting machine.

Brief Summary Text (25):
Another embodiment according to the invention enables the connecting member between the pulse detector and the vibration sensor to be connected to the harvesting machine via vibration damping material, such as a rubber bushing socket. A structural part, which permits a certain spacing between the pulse detector and the vibration sensor, can also serve this purpose.

Drawing Description Text (9):
FIG. 7 is a front view similar to FIG. 5, but illustrating the sensor with the pulse detector located in the direction of the flow of harvested material, and a connecting member which is connected to a vibration-damper; and

Detailed Description Text (2):
FIG. 1 is a schematic view of a vibration sensor 1 which can be directly connected to a pulse detector (various embodiments of which are hereafter described) via the vibration sensor's bore 7. Vibrations are generated by means of particles of harvested material dropping onto the pulse detector, e.g. 10, which are transmitted via a coupling surface 2 directly into the vibration sensor 1. The coupling surface 1 is one means for communicating the pulse detector with the piezoelectric vibration sensor, the coupling surface 1 may also act in concert with a structural part 29, as discussed below, for communicating the pulse detector with the piezoelectric vibration sensor. A metal sleeve 3 transmits the vibration to a piezo-ceramic ring 4 provided on both sides with contact rings 8. Due to the inertia of the mass 5 located above the piezo-ceramic ring 4, forces are exerted in the rhythm of the vibrations on the piezo-ceramic 4. These forces produce a displacement in the piezo-ceramic 4, and thus produce a measurable electrical voltage between the top and bottom of the ceramic. The electrical voltage is taken off via the contact ring 8, and are available as a measurement signal at the plug-in contacts 9. This voltage is passed to amplifier, filter and integrator circuits.

Detailed Description Text (3):
In FIG. 2, the vibration sensor 1 is screwed directly to a plate-shaped pulse detector 10. The pulse detector 10 is formed by a plate, which extends across part of or the whole width of the separator or threshing unit, and is preferably located vertically to the flow of harvested material. The vibration sensor 1 is screwed by a flat head screw 11 through the bore 7 to the pulse detector 10. The screw head 1 5 has a diameter which corresponds approximately to that of the diameter of the coupling surface, which results in a uniform surface pressure. An electronic evaluation system 12 is coupled directly to the vibration sensor 1, allowing weak measurement signals to be transmitted directly to the electronic evaluation system 12 without notable losses. The measurement signals are then transmitted via the signal line 13 communication network 40, or bus system 41 to a subsequent evaluation unit 12A, operational testing unit 38 or display unit 39.

Detailed Description Text (4):
In FIG. 3, the vibration sensor 1 is shown in conjunction with a tubular pulse detector 14. The pulse detector 14 extends over part of or over the totality of the separator or threshing unit width. The pulse detector 14 can also extend beyond the separator or threshing unit width so that the vibration sensor 1 is not exposed directly to the flow of material. An adapter 16, which contains a centrally located bore 18, is pressed into one tube end. The vibration sensor 1 is fastened with the aid of an elongate screw 17 into the bore 18.

Detailed Description Text (6):
Securing members 19 are attached to the ends of the pulse detector 10. These securing members 19 connect the sensor 23 to the harvesting machine by vibration dampers 20. A multiple flange 22, shown at the top of FIG. 4, serves to stabilize the pulse detector 10 and also provides a guide for conductors 24.

Detailed Description Text (7):
FIG. 5 shows a rod-like or cylindrical pulse detector 25 connected directly to a vibration sensor 1 with the aid of a headless screw 26. The headless screw 26 has a bore on its unthreaded end extending vertically to the longitudinal axis of the cylindrical pulse detector 25. The bore provides a means by which the vibration sensor 1 and pulse detector 25 is connected. The headless screw 26 with the pulse detector 25 is thrust through the vibration sensor 1 and screwed to a structural part 29, cast into a vibration damper 28, and provided with an internal thread. The peripheral surface of the pulse detector 25 is connected with a specific surface pressure to the vibration sensor 1 via the tightening moment of this screw connection. A further structural part 30 with a threaded pin is also cast into the vibration damper 28. By means of this threaded pin the sensor 23 can be connected directly to the harvesting machine via a retaining bracket 31. In conjunction with a cylindrical pulse detector 25, it has proven to be particularly advantageous if the coupling point is a direct connection of the vibration sensor 1 with the peripheral surface of the pulse detector 25. As a rule, pulse detectors 25 are inserted vertically to the direction of the flow of the harvested material crop. The pulse detector 25 is then stimulated radially by the material to be measured. This stimulation can be introduced via a structural part directly into the vibration center. The structural part may be, for example, the above described headless screw 26. The pulse detector 25 is secured directly to the vibration sensor 1 by means of the threaded portion on the structural part. The peripheral surface then has direct contact with the coupling surface 2.

Detailed Description Text (9):
FIG. 7 shows another way in which the sensor 23 can be attached in a harvesting machine. A pulse detector 32 has an angled end profile with any cross-sectional shape. In this case the pulse detector 32 is located in the direction of the flow of harvested material. The bevels 37 at the ends of the pulse detector 32 prevent any straw or weeds in the flow of harvested crop from being broken up and deposited at the pulse detector 32. A plate 35 is, for example, a guide and stabilizing plate in a mower harvester's cleaning device, aligned in the direction of material flow. It extends over the entire width of the cleaning device and can serve as a securing means for one or more of the sensors 23 according to this embodiment of the invention. The sensor 23 is held in a hole in the plate 35 by a vibration-damping bushing 33 having an internal diameter which is greater than the screw diameter selected for the connection. A structural part 34 is welded, soldered or otherwise fixed directly to the pulse detector 32. The part 34 has a head 36 with a diameter greater than the internal diameter of the socket of bushing 33. The structural part 34 has, over a length shorter than the thickness of the bushing socket 33, a diameter which roughly corresponds to the internal diameter of the bushing socket 33. The structural part then tapers to the screw diameter selected for the connection and terminates in a thread. By means of this thread and a nut 27, the pulse detector is screwed to the vibration sensor. Due to the special design of the structural part 34, the bushing socket 33 is compressed when screwed to the vibration sensor 1. The sensor 23 is thus held on the plate 35 and secured against rotation.

Detailed Description Text (10):
Furthermore, the pulse detector 32 communicates directly with the coupling surface 2

of the vibration sensor 23 via the structural part 34. The single coupling point is particularly advantageous because by means of a single screw connection the sensor 23 can be brought directly into contact with the pulse detector 32. Only one tightening moment need be taken into account during assembly. This type of attachment has the further advantage that the sensor 23 only slightly hinders the flow of harvested material, and the vibration sensor 1 and the mounted electronic evaluation system 12 are effectively protected against contamination.

Detailed Description Text (12):
The evaluation unit 12 of the vibration sensor 1 signals includes a pass filter. The operational range of the filter is variable and may be preselected for various types of harvested material by means of a preselector circuit. The entire operational range is preferably sub-divided into partial ranges. The arrangement is such that a diagnostic partial range is available where the basic vibrations of the attachment and structure of the sensor 23 can be determined in a defined state of stimulation. The vibrations detected can be intermediately stored in storage means 40 and used as a desired value for further operational tests. The basic vibrations are not automatically stored, which is only carried out after the initial assembly or after any necessary repair to the sensor 23.

CLAIMS:

19. A harvesting machine according to claim 14, including a plurality of sensors on the harvesting machine, and wherein the operational testing is carried out simultaneously on the sensors.

20. A harvesting machine according to claim 14, including a plurality of sensors on the harvesting machine, and wherein the operational testing on the sensors is carried out according to a preselected sequence.